

ABSTRACT

A method and apparatus for measuring particulates in vehicle emissions. An ultraviolet light beam having a predetermined wavelength, and an infrared light beam having a predetermined wavelength are propagated through the exhaust plume of a vehicle that has passed on the road. The reduction in intensities of the light beams are measured. The reduction in intensity of the ultraviolet light is due to scattering of the light by particles in the exhaust. A portion of the reduction in intensity of the infrared light is due to absorption of the light by carbon dioxide in the exhaust and a portion of the reduction in intensity is due to the scattering of light by the particles in the exhaust. To distinguish between the two, a portion of the infrared light is run through a test cell with a known amount of carbon dioxide. The reduction in intensity is measured and compared with the reduction in intensity of the infrared light passing through the exhaust plume. As one measure of particulate content, the ratio of the particles in the exhaust whose diameter is greater than said predetermined wavelength of ultraviolet light to the density of the carbon dioxide in the exhaust plume is calculated. Another measure of particulate content is the ratio of the particles in the exhaust whose diameter is greater than said predetermined wavelength of infrared light to the density of the carbon dioxide in the exhaust plume. The average size of the particles is calculated from the ratio of the particles whose diameter is greater than the predetermined wavelength of ultraviolet light to the particles whose diameter is greater than the predetermined wavelength of infrared light is calculated. The average particle size is determined from the Mie efficiency using Mie scattering and absorption theory.